The State of Washington Pension Funding Council
Actuarial Services Audit Report
August 2002

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The State of Washington Pension Funding Council
C/O Mr. John Charles, Chairman
Insurance Building
302 - 14th Avenue SW
Olympia, WA 98504-3113

Ladies and Gentlemen:

The enclosed report presents the findings and comments resulting from a detailed review of the actuarial services being performed by the Office of the State Actuary. Milliman USA was selected to undertake this review project following an RFP process completed in July of this year.

Our major findings are included in the Executive Summary section of the report. More detailed commentary on our review process and some suggested considerations for refinements in actuarial procedures or presentations are included in the latter sections.

We pursued this review with a constructive mindset. We looked to identify any possible suggestion that might improve the Council's understanding of or confidence in the actuarial services being provided. Naturally, some of the comments may be viewed as personal preference in nature. While we are not trying to impose our own preferences or biases on the Council or the OSA, we make such comments if we believe that some change, however minor, might result in a better work product.

We wish to express our appreciation for the complete and timely cooperation provided to us by the Deputy Actuary, Larry Risch and his staff.

We look forward to making a personal presentation of this report to the Council and to answering any questions that members may have.

Sincerely,

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Executive Summary

The primary purpose of an actuarial review is to provide assurance to the Pension Funding Council (PFC) that the actuarial functions of the State's several Retirement Systems are being completed properly, in accordance with all applicable statutes and actuarial standards of practice. Further, the main purpose of the review is to ascertain that the proposed contribution rates for the 2003-2005 biennium have been calculated correctly and that the methodology used to determine the rates is appropriate. **Our analysis confirms that the proposed rates were calculated correctly and are appropriate based on the statutory requirements and the funding objectives of the Systems.**

This report describes our audit processes in more detail and will offer some observations and comments on areas of actuarial practice that the OSA may wish to consider for future valuation and experience study reports. An actuarial audit can be viewed as an opportunity to identify any areas where we believe that current actuarial procedures could be improved in order to achieve greater value and understanding from the actuarial services performed. We do not believe any of these observations or comments need to be implemented or reflected in the current proposed contribution rates.

Our conclusions concerning the primary issues of this review are as follows:

- **Assumptions:** The actuarial assumptions developed by the 1995 - 2000 Experience Study are reasonable and appropriate to use in the September 30, 2001 actuarial valuations. We believe the assumptions are appropriate and meet the principles prescribed by the Actuarial Standards Board (ASB) in their Standard of Practice No. 35 for demographic assumptions.

- **Data:** The data used by the OSA to perform the valuations is reasonable compared to the original data sent to them from the DRS.

- **Liabilities:** The internal valuation system used by the Office of the State Actuary (OSA) appears to accurately reflect the benefit obligations and present value of future benefits for each System studied. Our review was a "peer review" audit, meaning only sample members were evaluated. We did not completely value the total liabilities for any one System. Our review of the valuation techniques was very technical and concentrated on the detail aspects of the valuation system. We studied 50 sample members and found them to be accurate. Based on this review, we have a high confidence level that the provisions of the Retirement Systems are being reflected accurately by the OSA valuation work.

- **Assets:** The OSA must receive asset information from several different sources to compute both the market value of the valuation assets and then to calculate the actuarial value of the valuation assets. We reviewed their worksheets and are satisfied that the calculations were properly performed. The methodology is somewhat unusual but is reasonable based on the information available to the OSA.

- **Contribution Rates:** The OSA staff has accurately prepared contribution rates based on the calculated actuarial assets and liabilities. The funding methods were previously adopted for each Retirement System and meet the requirements of the statutes and the long-term funding goals of the Systems.

- **Professional Opinions:** In setting actuarial assumptions, the techniques used are often more of an art than a science. Thus, there is a broad range of methods and philosophies that will meet the reasonable standards as set out by the ASB. Often different actuaries will have different opinions about how to proceed in establishing assumptions that are to reflect future, unknown experience. In setting the mortality assumption, at least for current active members' future benefit payments, we prefer to use a lower mortality rate than that reflected by recent retired member experience to reflect longer life expectancy in the future. The OSA has a slightly different philosophy when setting the mortality assumption. Our preferred approach would result in a larger present value of benefit liabilities and thus could affect the contribution rates. However, this is more of a personal preference and does not imply that the current assumptions are inappropriate or incorrect to use in setting the new contribution rates.

We wish to express our appreciation for the complete and extremely timely cooperation provided to us by the OSA staff and in particular, the Deputy Actuary, Mr. Larry Risch. This project could not have been completed as scheduled without their extra effort in providing us with their immediate attention to our requests over the three-week period of our review.

Experience Study

Overview and Summary

The purpose of the actuarial valuation is to analyze the resources needed to meet the current and future obligations of the System. To provide the best estimate of the long-term funded status of the Systems, the actuarial valuation must be predicated on methods and assumptions that will foretell the future obligations of each System in a reasonably accurate manner.

An actuarial valuation utilizes various methods and two different types of assumptions: economic and demographic. Economic assumptions are related to the general economy and its long-term impact on the Systems, or to the operation of each System itself. Demographic assumptions are based on the emergence of the specific experience of each System's members.

The Office of the State Actuary (OSA) carries out an experience study of demographic assumptions for the major Washington Retirement Systems every six years. The most recent such study was for the six-year period ended December 31, 2000.

We believe all of the demographic assumptions adopted by OSA are reasonable and appropriate. However, there is room for professional preference in setting assumptions, which is sometimes more of an art than a science. Our recommendations for alternative approaches to setting the assumptions are based on our actuarial judgement and experience with other public retirement systems. A recommendation of an alternative approach for setting an assumption does not necessarily indicate that those currently used are inappropriate. However, we believe the assumptions should reflect each System's experience, based on the results of one or more investigative studies. Our recommendations are to provide the Council with a second opinion.

The choice of economic assumptions (rates of investment return and general wage increases) is dictated by RCW 41.45, and is beyond the scope of our review. However, we have included some general comments on how these assumptions compare to other public retirement systems. The demographic assumptions (rates of mortality, retirement, disablement, other terminations of employment, "real" salary increases – those due to promotion and longevity, etc.) - are discussed in this section of the audit report.

In reviewing the assumptions currently used by the OSA, we are guided by the Actuarial Standards Board (ASB) Actuarial Standards of Practice Nos. 27 (economic assumptions) and 35 (demographic assumptions). In addition to considering the degree of uncertainty in the assumptions and the combined impact of all assumptions, the actuary is required by the standard to consider the reasonableness of each actuarial assumption independently on the basis of its own merits, of its consistency with each other assumption, and of the potential for future fluctuations. Although a set of assumptions in aggregate may appear to reflect each System's experience, failing to isolate the individual assumptions can lead to inappropriate results when a particular aspect of the plan or a change in the plan is under review.

With minor personal preferences, we found the demographic assumptions used by OSA to be reasonable and appropriate for valuation purposes for the various Systems. In most cases, the work done by OSA to develop assumptions was quite clear and easy to follow. We had only minor suggestions with some of the development of the demographic assumptions such as mortality and retirement. These suggestions are explained further in this report.

When we refer to an assumption as being conservative, we believe that future experience may be more likely to produce actuarial gains rather than losses. Likewise, if we consider an assumption aggressive, we believe that future experience may be more likely to produce actuarial losses rather than gains. A moderate assumption is expected to be neither conservative nor aggressive.

Economic Assumptions

A comprehensive review of economic assumptions is beyond the scope of our audit. In brief, these are the annual rates used by OSA in the 2001 valuations pursuant to RCW 41.45.

Investment Return Rate:	8.00%
Salary Inflation Rate:	4.50%
Inflation (CPI):	3.50%

We believe these assumptions are reasonable, and they are comparable to average assumptions used by other public retirement systems. Based on the 2001 Survey of State and Local Government Employee Retirement Systems from the Public Pension Coordinating Council, the average economic assumptions used by 263 public plans are as follows:

Investment Return Rate:	7.91%
Total Salary Increase (includes longevity and merit):	5.56%
Inflation (CPI):	3.97%

As with any survey, there can be a broad range of actual factors making up the average. For the Investment Return Rate assumption, 23% of the systems used a rate between 7.0% and 7.9%, and 65% used a rate between 8.0% and 8.9%. There was a slightly wider spread with respect to the Total Salary Increase Rate assumption. That rate was less than 5.00% for 20% of the systems, 5.0% to 5.9% for 27% of the systems and 6.0% to 6.9% for another 27% of the systems. However, 18% of the systems did not report a total salary increase assumption at all.

Demographic Assumptions

This section of our report comments on our review of OSA's study of demographic assumptions. The first step in the study of demographic assumptions is to compare actual results with expected results. That is, what happened during the study period compared to what would have happened based on the assumptions used in the most recent actuarial valuation. If the actual results vary significantly from those expected, revised assumptions are proposed for use in future valuations.

The actual rates are compared with those assumed by the actuary. Alternative rates are considered if the overall actual termination rate differs significantly from the overall expected rate, or if the pattern of actual rates by age or service group does not follow the expected pattern. The alternative rates are tested, by using them to recompute the expected numbers of terminations. The results are compared with the actual numbers. The rates that best reflect recent experience are recommended for use in future valuations of the Systems.

Our review covered the following assumptions:

- Mortality
- Retirement
- Disability
- Termination
- Termination with Vested Benefit
- Portability
- Step/Longevity Salary Increase
- Development of Average Final Compensation
- Percent Married
- Certain and Life Annuities
- Military Service Credit
- Age Difference

Our only comments on the assumption setting process relates to the philosophy used in making changes to assumptions.

Assumption Philosophy

The experience study uses a measurement tool that expresses the actual decrements to the expected decrements, known as the Actual to Expected ratio or A/E. These ratios will not distort the results due to either a declining study group, or an increasing group. The A/E ratio eliminates this group size distortion and looks solely at the assumption's fit.

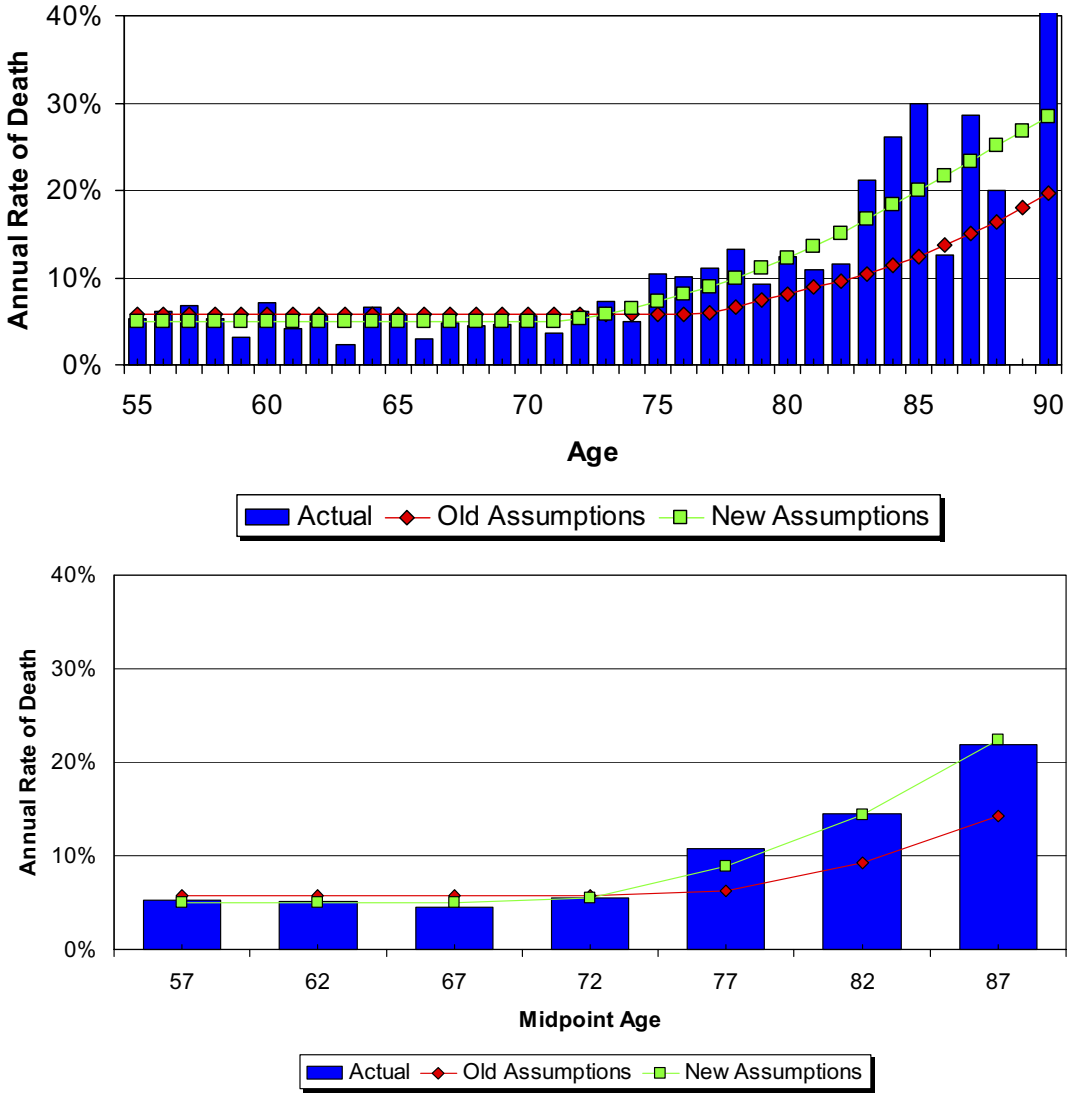
The experience study report generally shows the aggregate actual to expected decrement (A/E) ratios for the appropriate assumptions. Where the A/E ratios are larger than 100%, the rates may need to be raised; meaning the assumption understated the probability of decrement and ratios smaller than 100% indicate that rates may need to be lowered. Depending on the size of the measurement and its creditability, an acceptable tolerance level due to expected fluctuations may range from 110% to 90% before an assumption change may be indicated. However, when we review assumption changes we would not necessarily recommend changes in long-term demographic assumptions based solely on the results of a single six-year study period. Moreover, changes made to make the A/E ratios precisely 100% may be too abrupt for some assumptions. Accordingly, we would recommend changes in assumptions that will generally bring the A/E ratio closer to 100%, but may not go all the way to 100%, moving in the direction of the trend indicated by the study period. Subsequent studies will then either confirm the direction of the trend or perhaps indicate the trend was not as long term as may have been expected.

In several cases, the OSA assumption changes apparently were made to target 100% A/E in aggregate, instead of 100% A/E for males and females separately. Since many assumptions are applied separately based on gender, we feel it is more appropriate to report A/E ratios for the two groups separately in the experience study report.

We have also observed that for many decrements the study group size was small, so that statistical aberrations could have accounted for the differences between the actual and expected decrements. In those cases, we usually will not recommend an assumption change or will add two study periods worth of data together to create a larger more statistically valid group.

Finally, we feel that graphing results is a useful tool for analyzing the overall “fit” of new or old assumptions to the actual experience. A graph can indicate ages where assumptions do not fit well to the actual experience, or show where proposed rates could be modified to create a smoother curve. Two examples of our standard graphs are shown on the following pages in Exhibits 1-1 and 1-2.

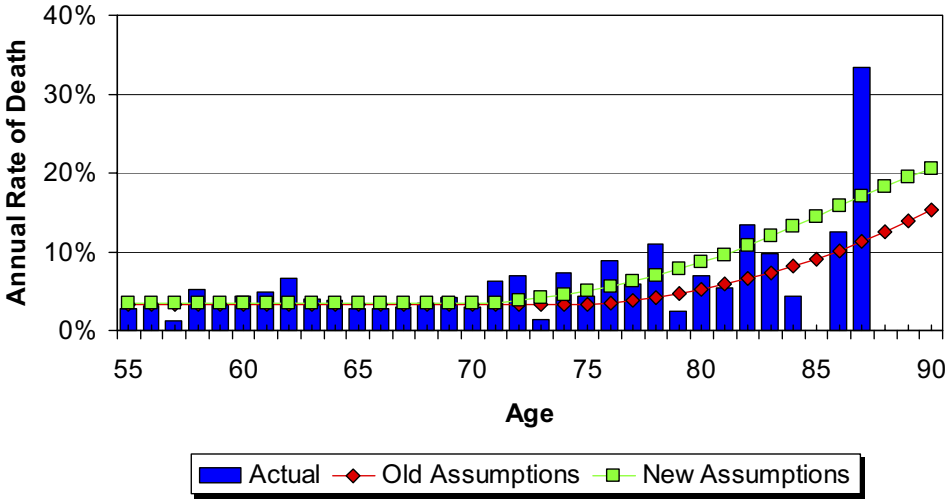
Exhibit 1-1
Mortality Rates
Disability Retirement – Male
(January 1, 1995 through December 31, 2000)

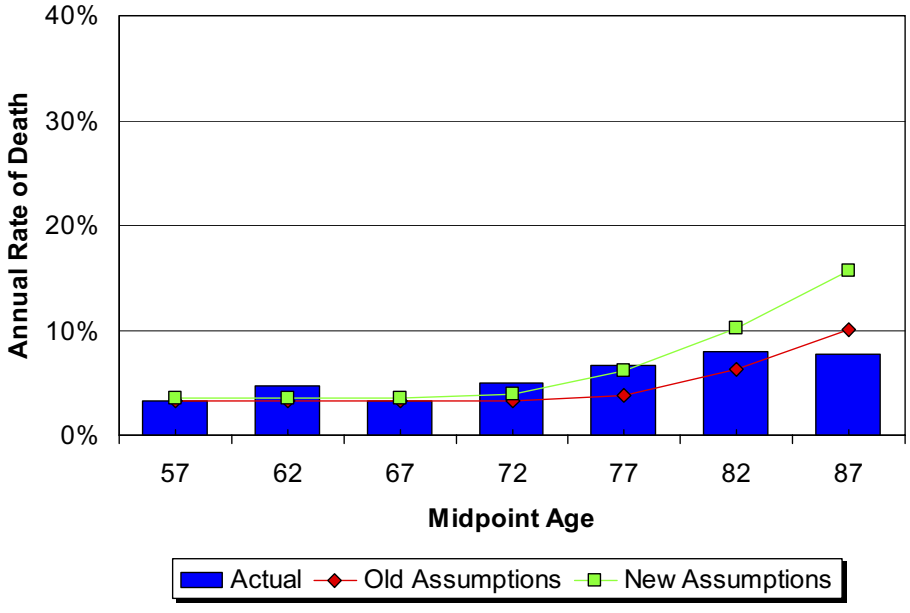


	Old Assumptions	Actual	New Assumptions
Total Count	343	335	339
Actual / Expected	98%		99%

Expected Mortality = The UP 1994 Mortality Table for Males set forward 2 years, minimum probability of 5.75%
Proposed Mortality = The RP 2000 Mortality Table for Males set forward 6 years, minimum probability of 5.00%

Exhibit 1-2
Mortality Rates
Disability Retirement – Female
(January 1, 1995 through December 31, 2000)





	Old Assumptions	Actual	New Assumptions
Total Count	187	231	226
Actual / Expected	124%		102%

Expected Mortality = The UP 1994 Mortality Table for Females set forward 2 years, minimum probability of 3.25%
Proposed Mortality = The RP 2000 Mortality Table for Females set forward 6 years, minimum probability of 3.5%

We reviewed in detail the extensive workpapers OSA used to measure and evaluate the development of each assumption. Overall, we agree with the conclusions and the proposed new assumptions. We believe all of the new assumptions are reasonable and acceptable, based on actuarial standards of practice. However, we offer a few observations on how we might have approached the development of the final assumptions differently; or where it should be mentioned that there was not enough creditable experience upon which to confirm the new assumptions.

Mortality

The new mortality table produced by the Society of Actuaries, the RP 2000 Table, is appropriate for use by OSA. With respect to mortality for the non-disabled retired members, the new tables (with age adjustments) provide A/E measurements varying from 100% to 107% for male members and from 93% to 112% for female members, depending on the system. We generally would recommend a ratio of 110% to provide an adequate cushion against the trend of further mortality improvements. As an example, the following tables show the impact on the A/E ratio of an additional one-year age offset for each of the main systems. Thus, we would classify the current mortality assumptions, as applied to active members, as somewhat aggressive – more likely to produce actuarial losses rather than actuarial gains in future valuations, at least for active member liabilities.

Healthy Mortality –Males

	Current Age Adjustments	Current Actual/Expected	Alternate Age Adjustments	Alternate Actual/Expected
PERS	0	106%	-1	117%
TRS	-2	100%	-3	112%
SERS	0	107%	-1	119%
LEOFF	0	102%	-1	114%

Healthy Mortality – Females

	Current Age Adjustments	Current Actual/Expected	Alternate Age Adjustments	Alternate Actual/Expected
PERS	0	93%	-1	103%
TRS	-2	101%	-3	112%
SERS	-2	100%	-3	111%
LEOFF	0	112%	-1	124%

The shaded adjustments are preferred to recognize some future mortality improvement.

We estimated that the preferred mortality assumptions as indicated in the previous tables would increase the expected present value of benefits by less than 3.0%. Depending on the funding status of each System, this could impact the level of contribution rates by a much higher percentage.

In addition, the preferred assumptions could be applied only in determining the active member liabilities. Under that approach, the margin used to recognize future mortality improvements would not impact the determination of actuarial equivalence for optional forms of payments or service purchases. Another approach is to use a different basis for funding purposes than for the definition of actuarial equivalence. The statute would need to reviewed, or possibly changed in order for this to occur. We would be glad to explain these other approaches to you.

The assumptions for disabled member mortality use the healthy RP 2000 tables with age offsets and minimum rates of mortality. For some systems (especially, PERS and SERS), the minimum rates of mortality used seem fairly high when compared to other public retirement systems. While the actual data may support this approach, we recommend that OSA consider using a standard disabled mortality table (such as the RP 2000 disabled lives table) with no minimum mortality rates instead of an adjusted healthy mortality table. Alternatively, a different age offset with slightly lower minimum mortality rates may give a better fit to the actual experience.

Service Retirements

In 2000, PERS, SERS, and TRS 2/3 introduced enhanced early retirement factors at age 55 with 30 years of service. These provisions are relatively new and there is not yet significant experience upon which to base assumptions. Retirement rates for those members with 30 years of service were set at 1.5 times the rate for those with less than 30 years of service. While this approach is reasonable until better experience emerges, it would be insightful to have some discussion of how the 1.5 factor was arrived at. We believe it may relate to the TRS 1 experience, where members can retire with 30 years of service.

For LEOFF 2, the normal retirement age was lowered from 55 to 53, with 3% per year reduction factors down to age 50 with 20 years of service. These changes, effective in 2000, will have an emerging impact on the assumed rates of retirement. In the experience study report, neither the previous assumptions nor the new assumptions are a good fit to actual experience. The recent experience indicates a significantly lower probability of retiring than the old assumptions had expected. While the new assumptions improve on the retirement trends by age, they still assume a higher probability of retirement at nearly all ages than the recent experience indicated. The new retirement rates are still considered reasonable, as they recognize the recently adopted benefit improvements, which are expected to lead to more retirements at younger ages prior to 60.

Methodology

The methodology used by the OSA appears appropriate. We have listed several items in Appendix A where we might prefer changes. Only one of these items has a small potential impact on the LEOFF 1 group. The remainder are areas where the experience study or valuation report might have more complete disclosure, but have no measurable impact on the valuation results.

Membership Data

Overall, the data process appears to be thorough and accurate. We would add the following comments:

- **Raw Data:** The data provided by DRS is quite comprehensive in the information provided for each individual. The only two limitations that we observed were:
  1) The salary information was not reliable in some cases. Given the number of different employers reporting this information, this is not surprising. The OSA staff makes adjustments to account for this.
  2) The beneficiary information was not complete for LEOFF 1 retirees. The OSA staff makes adjustments to account for this.

  Although we did not audit the accuracy of the individual records provided by DRS, we did perform an overall reasonableness check for the retiree data. We compared the total benefit amounts provided by DRS with the total benefits actually paid in the prior year. We found these amounts to be consistent for each plan.

- **Editing:** The OSA staff performs extensive editing on the data. These steps are well documented by the staff. Although, we did not review the editing process in detail, our overall impression was that it was reasonable and appropriate.

- **Grouping:** Members with similar characteristics are combined during the active data processing (retiree data is not combined). This is an acceptable approach, used by other actuaries dealing with large amounts of data. The grouping approach reduces the number of records processed in the valuation; the result is a significant reduction in the time required to run the valuation. The only possible drawback is that some characteristics of a specific individual may be lost. However, for this valuation, we do not believe there is any loss of accuracy. Given the requirements for a short turnaround that the OSA staff is sometimes presented with, their preference is to retain the grouping approach. We agree that this is a reasonable.

- **Parallel Data Processing:** We performed independent edits on the raw data and then compared our results with the valuation data used by OSA. Although our editing process was not nearly as extensive as that done in the valuation, we found our results to be reasonably consistent. A summary of this is shown in Exhibits 2-1 and 2-2. The only difference of note is that some members originally coded as actives were removed or converted to vested termination status by the OSA staff. The result is that Milliman's active counts are slightly higher, and our vested termination counts are generally lower. As we did not perform the extensive edits done in the valuation, it is not surprising there is this small difference.

The data processing done by the OSA staff appears to be thorough and accurate. We do not recommend any changes to the current procedures.

Exhibit 2-1
Active Member Statistics

ACTIVE MEMBERS						
				AVERAGE		
SYSTEM		NUMBER	ANNUAL SALARY (in $Millions)	AGE	MONTHLY SALARY	CREDITED SERVICE
PERS						
Plan 1	OSA	23,981	$ 1,085	54.0	$ 45,226	20.7
	Milliman	24,275	1,089	54.0	44,864	20.7
Milliman / OSA Ratio		101.2%	100.4%	100.0%	99.2%	100.0%
Plan 2	OSA	128,955	$ 5,294	43.4	$ 40,707	8.1
	Milliman	132,479	5,319	43.2	40,146	8.0
Milliman / OSA Ratio		102.7%	100.5%	99.6%	98.6%	98.8%
TRS						
Plan 1	OSA	13,971	$ 803	53.9	$ 57,454	23.2
	Milliman	13,960	803	53.9	57,494	23.2
Milliman / OSA Ratio		99.9%	100.0%	100.0%	100.1%	100.0%
Plan 2	OSA	8,056	$ 391	47.8	$ 48,563	10.6
	Milliman	8,278	402	47.8	48,618	10.6
Milliman / OSA Ratio		102.8%	102.9%	100.0%	100.1%	100.0%
Plan 3	OSA	44,193	$ 1,958	40.0	$ 44,312	7.6
	Milliman	45,443	2,034	40.0	44,760	7.5
Milliman / OSA Ratio		102.8%	103.9%	100.0%	101.0%	98.7%
SERS						
Plan 2	OSA	24,063	$ 486	46.5	$ 20,193	6.9
	Milliman	24,880	514	46.4	20,647	6.8
Milliman / OSA Ratio		103.4%	105.7%	99.8%	102.2%	98.6%
Plan 3	OSA	24,284	$ 518	45.1	$ 21,324	7.0
	Milliman	25,018	548	45.0	21,923	6.9
Milliman / OSA Ratio		103.0%	105.9%	99.8%	102.8%	98.6%
LEOFF						
Plan 1	OSA	1,315	$ 87	52.4	$ 65,959	27.5
	Milliman	1,325	87	52.4	65,850	27.5
Milliman / OSA Ratio		100.8%	100.3%	100.0%	99.8%	100.0%
Plan 2	OSA	13,585	$ 831	38.5	$ 61,139	9.9
	Milliman	13,653	835	38.5	61,150	9.9
Milliman / OSA Ratio		100.5%	100.5%	100.0%	100.0%	100.0%
WSP						
Plan 1	OSA	1,027	$ 60	38.3	$ 58,633	11.7
	Milliman	1,027	60	38.3	58,595	11.7
Milliman / OSA Ratio		100.0%	100.0%	100.0%	99.9%	100.0%
Grand Total						
	OSA	283,430	11,513	44.6	$ 40,620	9.9
	Milliman	290,338	11,691	44.5	40,268	9.8
Milliman / OSA Ratio		**102.4%**	**101.5%**	**99.7%**	**99.1%**	**98.8%**

Exhibit 2-2
Retired & Terminated Member Statistics

RETIRED MEMBERS			
SYSTEM		NUMBER	AVERAGE MONTHLY BENEFIT
PERS			
Plan 1	OSA	53,538	$ 1,098
	Milliman	53,538	1,097
Milliman / OSA Ratio		100.0%	99.9%
Plan 2	OSA	8,651	$ 546
	Milliman	8,651	546
Milliman / OSA Ratio		100.0%	100.0%
TRS			
Plan 1	OSA	32,195	$ 1,409
	Milliman	32,195	1,409
Milliman / OSA Ratio		100.0%	100.0%
Plan 2	OSA	709	$ 854
	Milliman	709	854
Milliman / OSA Ratio		100.0%	100.0%
Plan 3	OSA	203	$ 367
	Milliman	203	367
Milliman / OSA Ratio		100.0%	100.0%
SERS			
Plan 2	OSA	191	$ 452
	Milliman	191	452
Milliman / OSA Ratio		100.0%	100.0%
Plan 3	OSA	78	$ 212
	Milliman	78	212
Milliman / OSA Ratio		100.0%	100.0%
LEOFF			
Plan 1	OSA	7,894	$ 2,620
	Milliman	7,894	2,620
Milliman / OSA Ratio		100.0%	100.0%
Plan 2	OSA	184	$ 1,063
	Milliman	184	1,063
Milliman / OSA Ratio		100.0%	100.0%
WSP			
Plan 1	OSA	696	$ 2,647
	Milliman	696	2,647
Milliman / OSA Ratio		100.0%	100.0%
Grand Total			
	OSA	104,339	1,269
	Milliman	104,339	1,268
Milliman / OSA Ratio		**100.0%**	**100.0%**

VESTED TERMINATED MEMBERS		
SYSTEM		NUMBER
PERS		
Plan 1	OSA	3,310
	Milliman	3,087
Milliman / OSA Ratio		93.3%
Plan 2	OSA	15,102
	Milliman	14,477
Milliman / OSA Ratio		95.9%
TRS		
Plan 1	OSA	1,990
	Milliman	1,955
Milliman / OSA Ratio		98.2%
Plan 2	OSA	2,342
	Milliman	2,167
Milliman / OSA Ratio		92.5%
Plan 3	OSA	1,730
	Milliman	1,537
Milliman / OSA Ratio		88.8%
SERS		
Plan 2	OSA	929
	Milliman	616
Milliman / OSA Ratio		66.3%
Plan 3	OSA	637
	Milliman	367
Milliman / OSA Ratio		57.6%
LEOFF		
Plan 1	OSA	29
	Milliman	19
Milliman / OSA Ratio		65.5%
Plan 2	OSA	303
	Milliman	281
Milliman / OSA Ratio		92.7%
WSP		
Plan 1	OSA	26
	Milliman	26
Milliman / OSA Ratio		100.0%
Grand Total		
	OSA	26,398
	Milliman	24,532
Milliman / OSA Ratio		**92.9%**

Actuarial Valuation Assets

The OSA is in a unique situation compared to most other actuaries in that the financial and asset information must be first compiled by their staff before an analysis for actuarial valuation purposes can be performed. This is because most of the assets are in investments held by the State Investment Board (SIB), but additional assets are also held and reported to the OSA by both the Treasury and the Department of Retirement Services (DRS).

We reviewed each of the worksheets and emails that supplied the information to the OSA staff and then followed the procedures used to calculate the market value of assets for each plan. The OSA then uses the market values and the actuarial asset method to determine the actuarial value of the assets which is then used to determine both the funding status of each plan and the proposed contribution rates.

The actuarial value of assets used by the Retirement Systems and first adopted for the 2000 valuations is a four-year smoothing method of asset gains and losses as measured on a market value basis. This means that the market value as of the valuation date is adjusted by 25% of the most recent year's gain or loss; 50% of the prior year's gain or loss, and 75% of the gain or loss from the valuation two years ago. Since the new method was only recently adopted, the 2001 actuarial assets only recognized 25% of the most recent year's gain or loss, and 50% of the prior year's gain or loss. This is an acceptable and reasonable implementation when changing asset methods.

In calculating the actuarial value of the assets, the OSA must first determine the asset gain and loss for the valuation period. For the September 30, 2001 valuations this was a nine-month period for all Systems except for TRS, which had a valuation period of 15 months, from June 30, 2000 to September 30, 2001. The actuarial value of the assets was computed using these unique valuation periods due to the change in the valuation dates from June 30, 2000 for TRS and December 31, 2000 for all other Systems. We believe this is the most reasonable and practical approach under the circumstances, but we would recommend that the facts be disclosed in the valuation report due to the unusual situation associated with the valuation date changes.

In addition to the unusual valuation periods for determining assets, the OSA had difficulties in the past in gathering the asset data and computing consistent rates of return on the investments compared to those that are reported by the SIB. Therefore, their procedure for determining the asset gain or loss for each valuation period is based on the cash flow of the funds in the SIB and the rate of return the SIB calculates on this basis. The OSA then used those calculations to compute the expected returns at the assumed 8.0% valuation rate and the difference is the gain or loss. Again this is somewhat unusual, but we feel quite reasonable given the information available.

We have confirmed that the actuarial value of the assets calculated for the September 30, 2001 valuations was accurate and reasonable.

Actuarial Liabilities

One purpose of this audit was to verify the benefits and liabilities. Although we did not reproduce the total liabilities of the Systems, we did an in-depth analysis of the liabilities of sample members. We found that all benefit provisions of the Systems were being accounted for in an accurate manner.

To perform this analysis, the OSA staff provided us with detailed calculations ("test lives") that are produced by their valuation system. In addition, we requested additional calculations for individual members. This allowed us to analyze the components of the calculations for each benefit type (withdrawal, service retirement, disability, etc.).

We then independently calculated the liabilities for the sample members. A detailed comparison for each of the approximately 50 test lives we reviewed is shown in Appendix B. We found the OSA calculations to be very consistent with ours. The only difference was in the calculation of the Uniform COLA for TRS 1 retirees only. After reviewing their preliminary calculations, the OSA staff reran the valuations, with a correction to the Uniform COLA. The overall increase in TRS 1 liabilities was less than 1%.

Additionally, we compared the benefits shown in the test lives with those stated in the member handbooks and the RCW. We found that all significant provisions are being accounted for.

We have commented on two other minor issues; however, neither of those would have a measurable impact on the contribution rates. A list of these issues is shown in Appendix C.

Based on our review, we feel that the OSA staff is valuing all provisions of the Retirement Systems in an accurate manner.

Valuation Results –Determination of Contribution Rates

Our key findings are:

- The calculated contribution rates finance the State's liabilities over the working lifetime of the current members in a reasonable fashion.
- The calculation of the contribution rates follows state law.

Different contribution rates are calculated for each System. The employer contribution rates within each System are level for members of all three Plans.

We reviewed the calculation of each System's contribution rates provided by OSA. We first verified that the liabilities generated by the OSA valuation system were properly input into the calculation worksheet, including the actuarial and market values of the assets. We then reviewed the methodology used to determine the contribution rates. We found that the funding formulas were appropriate, and the final contribution rates were calculated correctly.

The following provides comments on some of the funding aspects of the various Systems.

State Law: The calculation of the contribution rates is consistent with the actuarial funding of the State Retirement Systems mandated in Chapter 41.45 of the RCW.

Key details include:

- The Pension Funding Council will adopt employer (and state) contribution rates for each System which are the level percent of pay needed to: (41.45.060(2))

  Fully amortize the total costs for plan 1 of PERS, TERS, and LEOFF by June 30, 2024 (41.45.060(3)(a))

  Fully amortize the unfunded liability of WSP by June 30, 2024 (41.45.060(3)(a))

  Continue to fully fund plans 2 & 3 for PERS, TERS, SERS and LEOFF (41.45.060(3)(b))

  The SERS basic contribution rate will fund both that System and PERS Plan 1. (41.45.060(2)(c))

- PERS, TRS and SERS contributions to fully fund plans 2 and 3 are first deposited in a combined plan 2/3 fund. All remaining contributions are deposited in the corresponding plan 1 fund. Remaining contributions for SERS are deposited in PERS Plan 1. (41.45.050(5), (6) & (7))
- The aggregate actuarial cost method is used to calculate combined plans 2 and 3 employer contribution rates. (41.45.060(4))
- 30% of the cost of LEOFF Plan 2 will be paid by employers and 20% by the State (41.45.060(3)(c)). 50% of the cost of LEOFF Plan 2 will be paid by members. (41.45.061(5))

- The TRS Plan 2 member rate will not be more than either the employer rate, or the rate in effect on July 1, 1996. (41.45.061(1))
- The TRS Plan 2 member rate will not increase as a result of gain sharing amounts distributed to Plan 3 members. (41.45.061(1)(c))
- The PERS and SERS plan 2 member rates will be equal to the respective plan 2 and 3 employer rates. (41.45.061(2) & (4))
- The member rate for WSP will be equal to the greater of 2% or the employer rate. (41.45.0631)

Washington State Cost Method: The cost method creates level employer contribution rates for members of all three Plans. A non-standard variation of the aggregate cost method is used to achieve this goal. Different contribution rates are determined independently for PERS, TRS, LEOFF and SERS as follows:

1. The normal cost rate is calculated as the level percent of all future plan 2 and 3 salaries required to finance:
   (a) the present value of all plan 2 and 3 benefits for current members
   (b) less the plan 2/3 actuarial assets.
2. The unfunded actuarial accrued liability (UAAL) is calculated as:
   (a) the present value of all plan 1 benefits
   (b) less the plan 1 actuarial assets
   (c) less the present value of plan 1 future normal cost rate contributions which are equal to plan 1 salaries times the sum of (i) the employer paid half of the normal cost rate described for plans 2 and 3 in item 1 above and (ii) the employee contribution rate (6%).
3. The UAAL rate is calculated as the level percent of all future plan 1, 2 and 3 salaries through June 30, 2024 required to finance the UAAL. Future SERS salaries are included in the financing of the PERS UAAL.

Employer Contribution Rates: With the exceptions noted below,

- Employers contribute half of the normal cost rate and all of the UAAL rate. This is the same regardless of which plan the employee is in.

Member Contribution Rates: With the exceptions noted below,

- Plan 1 members contribute 6% of pay,
- Plan 2 members contribute half the normal cost rate, and
- Plan 3 member contributions go into their defined contribution accounts.

Law Enforcement Officers and Fire Fighters Plan 1: The actuarial assets of LEOFF Plan 1 exceed the present value of all future benefits. Since there is no UAAL the LEOFF Plan 1 members and employers currently contribute 0% of pay.

Washington State Patrol: WSP has only plan 1 as of September 30, 2001. The actuarial assets of WSP exceed the present value of all future benefits for the current members. Since there is no UAAL the employer contribution rate is zero. The RCW mandates that the member rate is equal to the greater of 2% or the employer rate. Therefore the member rate is 2%.

Adjustments for Timing of Rate Changes: RCW 41.45.060(6) states the director of the Department of Retirement Systems shall collect the rates currently established in state law through June 30, 2003. Thereafter, the director will collect the new rates adopted by the Council. It is our understanding that the TRS and SERS rates are expected to change as of September 1, 2003. The OSA contribution rate calculations accordingly incorporate the actual contribution rates in effect from the actuarial valuation date until the date the new contribution rates become effective on either June 30, 2003 for PERS, LEOFF & WSP, or September 1, 2003 for TRS and SERS. We found one minor difference in the calculation of the delay of implementation date for the PERS System. It was corrected prior to completing the determination of the final proposed contribution rates.

Gain Sharing: Consistent with the RCW the TRS Plan 2 member rate has been calculated so that it is not increased by the gain sharing amounts distributed to TRS Plan 3 members. When the TRS Plan 2 member rate is calculated an adjustment is subtracted from the present value of the unfunded benefits which is equal to the gain sharing amounts distributed to TRS Plan 3 members. The adjustment is tracked to account for differences in contributions. This method is also used for SERS and PERS, but no gain sharing payments have been made yet under those Systems.

Purpose of a Cost Method: The purpose of any cost method is to allocate the cost of future benefits to specific time periods. Most public plans follow one of a group of generally accepted funding methods, which allocate the cost over the members' working years. In this way benefits are financed during the time in which services are provided.

Most Common Public Plan Cost Method (Entry Age): The most common cost method used by public plans is the Entry Age Actuarial Cost Method. The focus of the Entry Age cost method is the level allocation of costs over the member's working lifetime. For a public plan this means current taxpayers pay their fair share of the pensions of the public employees who are currently providing services. Current taxpayers are not expected to pay for services received by a past generation, nor are they expected to pay for the services that will be received by a future generation. The cost method does not anticipate increases or decreases in allocated costs. The 2001 Survey of State and Local Government Employee Retirement Systems issued by the Public Plan Coordinating Council in March, 2002 shows that 59% of the responding systems use the Entry Age cost method. The next most common methods were the Projected Unit Credit and Aggregate cost methods which were both used by 11% of the responding systems.

Appendix A

Comments on Valuation Methodology

Finding	Recommendation	Impact
LEOFF 1 As mentioned in the Membership Data section of this report, one area that DRS provides OSA with less than complete data is LEOFF 1 beneficiaries. The OSA staff assumes that a certain percentage of members will be married at the time of death to account for this. DRS may now be able to provide accurate beneficiary information for future retirees.	Continue current approach. The availability of beneficiary data should be discussed with DRS, and the assumption should be reviewed with the next experience study.	Given the incomplete data, this assumption provides an accurate estimate of liabilities.
PERS 1 & TRS 1: Members may elect to take a refund of post 30-year contributions at retirement. The OSA staff analyzed this and found it to be cost neutral. This option is therefore not reflected in the valuation.	Continue current approach. The OSA staff may want to revisit this assumption at the next experience study.	If this option is truly cost neutral, there is no impact. Even if it were not cost neutral, the impact would be minimal, since only about 1% are currently participating in the program.
LEOFF 2, SERS 2 & TRS 2: The valuation assumes members contribute at a different rate in the future than they are currently contributing at. This is because contributions fluctuate from year-to-year, and are not likely to remain at the current low rates. To estimate the long-term rates the members will contribute at, the OSA staff used one-half of the long-term annual cost of the plan computed by the entry age cost method. We agree this is an appropriate assumption.	Continue current approach. It might be helpful to disclose the assumed contribution rates in the valuation report.	None.

Finding	Recommendation	Impact
All Plans: Adjustments are made to the data to account for less than complete information. We independently made adjustments and found our data to be reasonably consistent with that used by the OSA staff in the valuation.	Continue current approach.	None.
All Plans: Assumptions are made as to when a deferred vested member will commence benefits. This is not disclosed in the valuation report.	Continue current approach, but disclose assumption in valuation report.	None.
All Plans: Mortality for beneficiaries is assumed to be the same as that for the opposite gender in that System. We agree with this assumption.	Continue current approach, but disclose assumption in valuation report.	None.

Appendix B

Comparison of OSA and Milliman USA Calculations for Sample Test Lives

Exhibit 3-A1

STATE OF WASHINGTON
September 30, 2001 Actuarial Audit

Comparison of Active Test Lives

	PERS 1 Individual	PERS 2 Individual	SERS 2 Individual	SERS 3 Individual	TRS 1 Individual	TRS 2 Individual	TRS 3 Individual	Totals
LIABILITIES				**OSA**				
1. Present value of service retirement allowances	282,968	194,282	32,553	35,241	268,841	68,902	105,308	988,095
2. Present value of service disability retirement allowances	5,920	0	330	35	2,440	86	96	8,907
3. Present value of non-service disability retirement allowances	439	0	0	0	0	0	0	439
4. Present value of service death benefit	0	0	0	0	0	0	0	0
5. Present value of non-service death benefit	7,485	1,873	386	447	2,705	979	1,221	15,096
6. Present value of deferred vested benefits	1,885	0	4,236	1,150	3,445	2,688	2,710	16,114
7. Present value of members' contributions to be returned upon withdrawal or death during deferment	1,101	0	1,048	0	152	2,061	0	4,362
8. Present value of Uniform COLA (1)	15,941	0	0	0	19,523	0	0	35,464
9. Subtotals for active members	**299,798**	**196,155**	**38,553**	**36,873**	**277,583**	**74,716**	**109,335**	**1,033,013**
10. PVFE	429,343	211,000	145,000	177,000	454,000	649,000	557,000	2,622,343
LIABILITIES				**Milliman**				
1. Present value of service retirement allowances	283,013	193,875	32,986	35,423	264,386	70,279	105,429	985,391
2. Present value of service disability retirement allowances	5,943	0	361	40	2,479	78	74	8,975
3. Present value of non-service disability retirement allowances	457	0	0	0	0	0	0	457
4. Present value of service death benefit	0	0	0	0	0	0	0	0
5. Present value of non-service death benefit	7,944	1,800	378	440	2,945	896	1,286	15,689
6. Present value of deferred vested benefits	1,904	0	4,428	1,202	3,419	2,578	2,389	15,920
7. Present value of members' contributions to be returned upon withdrawal or death during deferment	1,089	0	1,081	0	159	1,967	0	4,296
8. Present value of Uniform COLA	19,184	0	0	0	22,366	0	0	41,550
9. Subtotals for active members	**300,350**	**195,675**	**39,234**	**37,105**	**273,388**	**75,798**	**109,178**	**1,030,728**
10. PVFE	429,239	210,561	146,352	178,390	440,635	653,578	555,202	2,613,956
RATIOS				**Milliman / OSA**				
1. Present value of service retirement allowances	100%	100%	101%	101%	98%	102%	100%	100%
2. Present value of service disability retirement allowances	100%	NA	109%	114%	102%	91%	77%	101%
3. Present value of non-service disability retirement allowances	104%	NA	NA	NA	NA	NA	NA	104%
4. Present value of service death benefit	NA	NA	NA	NA	NA	NA	NA	NA
5. Present value of non-service death benefit	106%	96%	98%	98%	109%	92%	105%	104%
6. Present value of deferred vested benefits	101%	NA	105%	105%	99%	96%	88%	99%
7. Present value of members' contributions to be returned upon withdrawal or death during deferment	99%	NA	103%	NA	105%	95%	NA	98%
8. Present value of Uniform COLA (1)	120%	NA	NA	NA	115%	NA	NA	117%
9. Subtotals for active members	**100%**	**100%**	**102%**	**101%**	**98%**	**101%**	**100%**	**100%**
10. PVFE	100%	100%	101%	101%	97%	101%	100%	100%

Exhibit 3-R1

STATE OF WASHINGTON
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Comparison of Retired Test Lives

	PERS 1 Group Sample	PERS 2 Group Sample	SERS 2 Group Sample	SERS 3 Group Sample	TRS 1 Group Sample	TRS 2 Group Sample	TRS 3 Group Sample	Totals
LIABILITIES				**OSA**				
1. Present value of benefit (w/out Uniform COLA)	12,529	34,303	60,228	16,258	55,359	53,309	44,827	276,813
2. Present value of Uniform COLA [(1)]	652	0	0	0	4,738	0	0	5,390
LIABILITIES				**Milliman**				
1. Present value of benefit (w/out Uniform COLA)	12,772	34,697	60,751	16,393	56,308	53,762	45,171	279,854
2. Present value of Uniform COLA	670	0	0	0	6,069	0	0	6,739
RATIOS				**Milliman / OSA**				
1. Present value of benefit (w/out Uniform COLA)	102%	101%	101%	101%	102%	101%	101%	101%
2. Present value of Uniform COLA [(1)]	103%	NA	NA	NA	128%	NA	NA	125%

	LEOFF 1 Group Sample	LEOFF 2 Group Sample	WSP Group Sample					Totals
LIABILITIES				**OSA**				
1. Present value of benefit	654,569	75,346	82,659					812,574
LIABILITIES				**Milliman**				
1. Present value of benefit	654,763	75,981	82,244					812,988
RATIOS				**Milliman / OSA**				
1. Present value of benefit	100%	101%	99%	NA	NA	NA	NA	100%

[(1)] *Values for Uniform COLA based on preliminary OSA calculations. Revisions were made to the Uniform COLA in the final OSA calculations.*

Exhibit 3-V1

STATE OF WASHINGTON
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Comparison of Deferred Vested Test Lives

	PERS 1 Individual	PERS 2 Individual	TRS 1 Individual	TRS 2 Individual	TRS 3 Individual	LEOFF2 Individual		Totals
LIABILITIES								
1. Present value of service retirement allowances	119,608	34,795	38,243	8,355	95,953	438,431		735,385
2. Present value of death benefits during period of deferment	3,765	884	897	640	1,156	0		7,342
3. Additional value of benefit provided by contributions (if value of 1 + 2 is < value of member contributions, member is assumed to take a refund)	0	0	6,098	8,809	0	0		14,907
4. Present value of Uniform COLA [(1)]	22,994	0	9,239	0	0	0		32,233
5. Total	**146,367**	**35,679**	**54,477**	**17,804**	**97,109**	**438,431**		**789,867**
LIABILITIES								
1. Present value of service retirement allowances	116,036	34,637	37,933	8,519	96,506	433,887		727,518
2. Present value of death benefits during period of deferment	3,542	860	885	710	1,173	0		7,170
3. Additional value of benefit provided by contributions (if value of 1 + 2 is < value of member contributions, member is assumed to take a refund)	0	0	6,421	8,575	0	0		14,996
4. Present value of Uniform COLA	22,811	0	11,605	0	0	0		34,416
5. Total	**142,389**	**35,497**	**56,844**	**17,804**	**97,679**	**433,887**		784,100
RATIOS								
1. Present value of service retirement allowances	97%	100%	99%	102%	101%	99%		99%
2. Present value of death benefits during period of deferment	94%	97%	99%	111%	101%	NA		98%
3. Additional value of benefit provided by contributions (if value of 1 + 2 is < value of member contributions, member is assumed to take a refund)	NA	NA	105%	97%	NA	NA		101%
4. Present value of Uniform COLA [(1)]	99%	NA	126%	NA	NA	NA		107%
5. Total	**97%**	**99%**	**104%**	**100%**	**101%**	**99%**		**99%**

Exhibit 3-A4

STATE OF WASHINGTON
September 30, 2001 Actuarial Audit

Comparison of Active Test Lives

	LEOFF 1 Group Sample	LEOFF 2 Group Sample	WSP Group Sample					Totals
LIABILITIES				**OSA**				
1. Present value of service retirement allowances	221,389	2,875,341	328,657					3,425,387
2. Present value of service disability retirement allowances	187,033	3,135	212					190,380
3. Present value of non-service disability retirement allowances	0	0	0					0
4. Present value of service death benefit	0	0	0					0
5. Present value of non-service death benefit	4,231	51,221	10,931					66,383
6. Present value of deferred vested benefits	0	31,638	2,966					34,604
7. Present value of members' contributions to be returned upon withdrawal or death during deferment	0	157,969	2,187					160,156
8. Present value of Uniform COLA	0	0	0					0
9. Subtotals for active members	**412,653**	**3,119,304**	**344,953**	**0**	**0**	**0**	**0**	**3,876,910**
10. PVFE	866,526	17,697,000	1,735,644					20,299,170
LIABILITIES				**Milliman**				
1. Present value of service retirement allowances	219,709	2,847,758	335,318					3,402,785
2. Present value of service disability retirement allowances	185,906	3,113	190					189,209
3. Present value of non-service disability retirement allowances	0	0	0					0
4. Present value of service death benefit	0	0	0					0
5. Present value of non-service death benefit	3,949	53,122	10,767					67,838
6. Present value of deferred vested benefits	0	33,751	3,043					36,794
7. Present value of members' contributions to be returned upon withdrawal or death during deferment	0	156,442	2,183					158,625
8. Present value of Uniform COLA	0	0	0					0
9. Subtotals for active members	**409,564**	**3,094,186**	**351,501**	**0**	**0**	**0**	**0**	**3,855,251**
10. PVFE	865,493	17,729,334	1,727,413					20,322,240
RATIOS				**Milliman / OSA**				
1. Present value of service retirement allowances	99%	99%	102%	NA	NA	NA	NA	99%
2. Present value of service disability retirement allowances	99%	99%	90%	NA	NA	NA	NA	99%
3. Present value of non-service disability retirement allowances	NA	NA	NA	NA	NA	NA	NA	NA
4. Present value of service death benefit	NA	NA	NA	NA	NA	NA	NA	NA
5. Present value of non-service death benefit	93%	104%	98%	NA	NA	NA	NA	102%
6. Present value of deferred vested benefits	NA	107%	103%	NA	NA	NA	NA	106%
7. Present value of members' contributions to be returned upon withdrawal or death during deferment	NA	99%	100%	NA	NA	NA	NA	99%
8. Present value of Uniform COLA	NA	NA	NA	NA	NA	NA	NA	NA
9. Subtotals for active members	**99%**	**99%**	**102%**	**NA**	**NA**	**NA**	**NA**	**99%**
10. PVFE	100%	100%	100%	NA	NA	NA	NA	100%

Exhibit 3-A3

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Comparison of Active Test Lives

	PERS 1 Group Sample	PERS 2 Group Sample	SERS 2 Group Sample	SERS 3 Group Sample	TRS 1 Group Sample	TRS 2 Group Sample	TRS 3 Group Sample	Totals
LIABILITIES				**OSA**				
1. Present value of service retirement allowances	247,537	2,775,143	19,841	134,948	523,420	57,733	1,718,117	5,476,739
2. Present value of service disability retirement allowances	321	10,334	76	449	3,819	82	1,955	17,036
3. Present value of non-service disability retirement allowances	4,804	0	0	0	0	0	0	4,804
4. Present value of service death benefit	0	0	0	0	0	0	0	0
5. Present value of non-service death benefit	6,688	78,867	630	4,182	8,514	1,182	31,264	131,327
6. Present value of deferred vested benefits	5,664	122,856	1,614	15,028	5,130	1,754	66,502	218,548
7. Present value of members' contributions to be returned upon withdrawal or death during deferment	5,968	353,671	3,339	0	369	1,861	0	365,208
8. Present value of Uniform COLA (Not shown in group sample cases)	0	0	0	0	0	0	0	0
9. Subtotals for active members	**270,982**	**3,340,871**	**25,500**	**154,607**	**541,252**	**62,612**	**1,817,838**	**6,213,662**
10. PVFE	866,526	41,389,000	329,000	4,002,000	884,000	605,000	33,482,000	81,557,526
LIABILITIES				**Milliman**				
1. Present value of service retirement allowances	247,473	2,766,947	19,537	132,910	513,918	59,149	1,728,191	5,468,125
2. Present value of service disability retirement allowances	295	10,218	82	462	3,996	76	1,919	17,048
3. Present value of non-service disability retirement allowances	4,787	0	0	0	0	0	0	4,787
4. Present value of service death benefit	0	0	0	0	0	0	0	0
5. Present value of non-service death benefit	6,773	79,749	608	3,932	9,000	1,216	33,006	134,284
6. Present value of deferred vested benefits	5,713	133,191	1,643	13,982	5,010	1,786	64,985	226,310
7. Present value of members' contributions to be returned upon withdrawal or death during deferment	5,914	345,749	3,462	0	419	1,988	0	357,532
8. Present value of Uniform COLA (Not shown in group sample cases)	0	0	0	0	0	0	0	0
9. Subtotals for active members	**270,955**	**3,335,854**	**25,332**	**151,286**	**532,343**	**64,215**	**1,828,101**	**6,208,086**
10. PVFE	865,493	41,387,488	323,136	3,966,388	820,022	603,137	33,465,828	81,431,493
RATIOS				**Milliman / OSA**				
1. Present value of service retirement allowances	100%	100%	98%	98%	98%	102%	101%	100%
2. Present value of service disability retirement allowances	92%	99%	108%	103%	105%	93%	98%	100%
3. Present value of non-service disability retirement allowances	100%	NA	NA	NA	NA	NA	NA	100%
4. Present value of service death benefit	NA	NA	NA	NA	NA	NA	NA	NA
5. Present value of non-service death benefit	101%	101%	97%	94%	106%	103%	106%	102%
6. Present value of deferred vested benefits	101%	108%	102%	93%	98%	102%	98%	104%
7. Present value of members' contributions to be returned upon withdrawal or death during deferment	99%	98%	104%	NA	114%	107%	NA	98%
8. Present value of Uniform COLA (Not shown in group sample cases)	NA	NA	NA	NA	NA	NA	NA	NA
9. Subtotals for active members	**100%**	**100%**	**99%**	**98%**	**98%**	**103%**	**101%**	**100%**
10. PVFE	100%	100%	98%	99%	93%	100%	100%	100%

Exhibit 3-A2

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Comparison of Active Test Lives

	LEOFF 1 Individual	LEOFF 2 Individual	WSP Individual					Totals
LIABILITIES			**OSA**					
1. Present value of service retirement allowances	446,576	120,285	464,327					1,031,188
2. Present value of service disability retirement allowances	130,809	145	61					131,015
3. Present value of non-service disability retirement allowances	0	0	0					0
4. Present value of service death benefit	0	0	0					0
5. Present value of non-service death benefit	7,089	2,151	3,704					12,944
6. Present value of deferred vested benefits	0	3,057	575					3,632
7. Present value of members' contributions to be returned upon withdrawal or death during deferment	0	5,487	13					5,500
8. Present value of Uniform COLA	0	0	0					0
9. Subtotals for active members	**584,474**	**131,125**	**468,680**	**0**	**0**	**0**	**0**	**1,184,279**
10. PVFE	134,000	685,000	271,000					1,090,000
LIABILITIES			**Milliman**					
1. Present value of service retirement allowances	444,209	119,968	476,212					1,040,389
2. Present value of service disability retirement allowances	126,112	144	47					126,303
3. Present value of non-service disability retirement allowances	0	0	0					0
4. Present value of service death benefit	0	0	0					0
5. Present value of non-service death benefit	7,089	2,296	3,677					13,062
6. Present value of deferred vested benefits	0	3,133	616					3,749
7. Present value of members' contributions to be returned upon withdrawal or death during deferment	0	5,468	13					5,481
8. Present value of Uniform COLA	0	0	0					0
9. Subtotals for active members	**577,410**	**131,009**	**480,565**	**0**	**0**	**0**	**0**	**1,188,984**
10. PVFE	135,026	686,027	271,000					1,092,053
RATIOS			**Milliman / OSA**					
1. Present value of service retirement allowances	99%	100%	103%					101%
2. Present value of service disability retirement allowances	96%	99%	77%					96%
3. Present value of non-service disability retirement allowances	NA	NA	NA					NA
4. Present value of service death benefit	NA	NA	NA					NA
5. Present value of non-service death benefit	100%	107%	99%					101%
6. Present value of deferred vested benefits	NA	102%	107%					103%
7. Present value of members' contributions to be returned upon withdrawal or death during deferment	NA	100%	100%					100%
8. Present value of Uniform COLA	NA	NA	NA					NA
9. Subtotals for active members	**99%**	**100%**	**103%**					**100%**
10. PVFE	101%	100%	100%					100%

Exhibit 3-R2

STATE OF WASHINGTON
September 30, 2001 Actuarial Audit

Comparison of Retired Test Lives

	PERS 1 Individual	PERS 1 Individual	TRS 1 Individual	TRS 1 Individual	WSP 1 Individual	WSP 1 Individual	WSP 1 Individual	Totals
LIABILITIES	**OSA**							
1. Present value of benefit (w/out Uniform COLA)	573,960	52,759	220,723	55,079	429,855	771,229	568,958	2,672,563
2. Present value of Uniform COLA [(1)]	15,012	2,531	27,348	10,784	0	0	0	55,675
LIABILITIES	**Milliman**							
1. Present value of benefit (w/out Uniform COLA)	577,751	53,829	222,288	55,773	437,192	781,810	575,462	2,704,105
2. Present value of Uniform COLA	13,671	2,161	30,658	12,305	0	0	0	58,795
RATIOS	**Milliman / OSA**							
1. Present value of benefit (w/out Uniform COLA)	101%	102%	101%	101%	102%	101%	101%	101%
2. Present value of Uniform COLA [(1)]	91%	85%	112%	114%	NA	NA	NA	106%

	LEOFF 1 Individual	LEOFF 1 Individual	LEOFF 1 Individual	LEOFF 1 Individual	LEOFF 2 Individual	LEOFF 2 Individual		Totals
LIABILITIES	**OSA**							
1. Present value of benefit	654,569	411,319	558,744	361,776	234,502	444,898		2,665,808
LIABILITIES	**Milliman**							
1. Present value of benefit	661,195	411,592	559,042	359,423	236,065	447,785		2,675,102
RATIOS	**Milliman / OSA**							
1. Present value of benefit	101%	100%	100%	99%	101%	101%	NA	100%

[(1)] *Values for Uniform COLA based on preliminary OSA calculations. Revisions were made to the Uniform COLA in the final OSA calculations.*

Appendix C

Comments on Actuarial Accrued Liability Calculations

Finding	Recommendation	Impact
TRS 1: For retired members, the Uniform COLA amount was incorrectly reflected in the preliminary calculations for TRS 1.	Final calculations correctly reflect the Uniform COLA; therefore no action is needed.	There was roughly a 10% increase in the TRS 1 retiree liability associated with the Uniform COLA. The overall impact on TRS 1 liabilities was less than 1%.
PERS: In the valuation, members are assumed to defer to age 65 and a half. Since they are eligible for unreduced benefits at 65, this somewhat understates the potential liability.	Assume deferral to age 65 in future valuations.	There will be some increase in the liability associated with future vested terminations for PERS 1; however, the overall impact on liabilities will be extremely small (< .1%).
TRS: The crediting of interest on member accounts is off by one-half of a year for valuation calculation purposes.	Revise method for crediting interest in future valuations.	The overall impact on liabilities will be extremely small (< .1%).